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Arcuator, a new genus of Chloropidae (Diptera), with a key to the Afrotropical and Palaearctic species

by

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ABSTRACT

The new genus *Arcuator* (type species, *Hippelates stigmaticus* Lamb) is proposed for eight known species from the Palaearctic, Afrotropical, and Oriental Regions and eight new Afrotropical species: *A. dewittei* (Zaïre), *aburensis* (Ghana), *melanicus* (Kenya; Ethiopia), *latimaculosus* (Zaïre), *deemingi* (Nigeria), *lindneri* (Nigeria; central Africa), *nigerensis* (Niger; west Africa), and *munroi* (South Africa; southern Africa). Two new but inadequately known species are noted and keyed, but left unnamed. *Hippelates jacobsi* Tonnoir (Luxemburg) is tentatively synonymised under *A. stigmaticus*.

INTRODUCTION

The generic name *Hippelates* has been used in all regions of the world for species of Chloropidae having a hind tibial spur, but this situation is gradually being changed as diverse elements are given separate status. One characteristic group of species with distinctive wing venation (cf. Fig. 1), the ultimate section of the fourth vein (M) arcuate anteriorly, has long merited a name and I here propose the name *Arcuator*.

This paper deals with the Afrotropical and Palaearctic species, but the genus also occurs widely in the Oriental Region. I have seen long series from Assam and Taiwan, and specimens from mainland China, Hainan, the Philippines, Sarawak, New Guinea, the Solomons (Guadalcanal), and the Bismarck Islands.

For a long time, as single or few specimens slowly accumulated, and these not always complete or well preserved, I was puzzled by apparent variation and possible sexual dimorphism in the colour of the 3rd antennal segment. However, a long series of Lamb's *Hippelates stigmatica* [sic] from the Seychelles, including a male and two females from the type series, gave opportunity for evaluating the characters here used in the key and for establishing the identity of this widely distributed species, which I have chosen as the type species. The consistency of certain characters in this and other good series that became available encouraged me to recognise species that had earlier appeared variable and incomprehensible.

One species represented only by a single female and another by a damaged male are included in the key to help avoid misidentifications that might occur if they were not indicated.

Certain small and reddish to yellow species of uncertain generic position, but suggestive of *Conioscinella*, are of similar size and habitus to *Arcuator* and tend to confuse the picture, especially because of their large black mesopleural spot. These species lack the hind tibial spur and have the ultimate section of 4th vein (M), beyond the discal cell, straight or only weakly and almost imperceptibly curved or sinuate. In the Oriental Region, such a species was even mixed in the type series of *Oscinella semimaculata* Becker, although Becker's description, in saying that the venation was the same as that of his already described *Oscinella maculata*, clearly applied to the species with arched vein.

In the Oriental Region, some species of *Cadrema*, notably *C. minor* (de Meijere), are also superficially similar to species of *Arcuator*, especially in the yellow pleuron with a single large polished black spot on the mesopleuron. However, species of *Cadrema* with preapical hind tibial spur, such as *C. minor*, have the ultimate section of 4th vein straight, r–m crossvein opposite middle of discal cell, marginal cell (cell r_1) broad, wider than the submarginal cell behind it, ocellars strongly cruciate and slightly proclinate, and hind tibial organ ('sensory area') very short.

The known species all occur in the Old World. In Andersson's key to the genera of Oscinellini (1977), the new genus will pass to *Lioscinella* Duda in couplet 41, but it is completely unlike either true *Lioscinella* or *Lioscinella* of European authors.

At the present time, the described species referable to the new genus are as follows, all as **new combinations**:

filia (Becker) 1911, *Annals. hist.-nat. Mus. natn. hung.* **9**: 154 *(Oscinella)*. New Guinea.

horni (Duda) 1930, *Stettin. ent. Ztg.* **91**: 299 *(Conioscinella)*. Sri Lanka.

jacobsi (Tonnoir) 1921, *Bull. Soc. Ent. Belg.* **3**: 134 *(Hippelates)*. Luxemburg. ?=*stigmaticus*.

opacus (Becker) 1912, *Annals. hist.-nat. Mus. natn. hung.* **9**: 249 *(Hippelates)*. Ethiopia.

bipustulatus Bezzi *in* Bezzi & Lamb, 1926, *Trans. Ent. Soc. London* **1925**: 557. Rodriguez. **Syn. n.**

pygmaeus (Becker) 1911, op. cit. **9**: 162 *(Oscinella)*. Java.

semimaculatus (Becker) 1911, op. cit. **9**: 164 *(Oscinella)*. Taiwan, New Guinea. *maculata* Becker 1911, op. cit. **9**: 155 *(Oscinella)*. Taiwan (as New Guinea, error corrected by Becker 1912, op. cit. **10**: 252).

sexstriatus (Becker) 1912, op. cit. **10**: 645 *(Oscinella)*. Replacement name. *pectoralis* Becker 1910, *Archvm. Zool., Bpest* **1**: 160 *(Oscinella)*. [Hungary]. Preocc. Coquillett 1898.

stigmaticus (Lamb) 1912, *Trans. Linn. Soc. London, ser. 2 (Zool.)* **15**: 334 *(Hippelates)*. Seychelles.

Some interesting observations in Nigeria by J. C. Deeming reveal some of the adult feeding habits. Specimens of *A. stigmaticus* were collected 'on cowpea *(Vigna sinensis)* new growth infested with ?*Aphis craccivora*'. Deeming has informed me that 'this is anything but an isolated occurrence. Any unsprayed cowpea plot at Samaru (N. Nigeria) with new vegetative growth would have aphids and also numbers of this little fly to be seen running about on terminal shoots.' However, 'groundnuts on the same farm were often heavily infested with *A. craccivora* but there the flies were not in evidence', so he could not be sure that the aphids were the attractant. A long series of *A. nigerensis* was collected 'on *Vigna*' at Tarna, Niger, but the exact association was not stated. However, also at Samaru, Nigeria, Deeming collected *A. nigerensis* 'feeding on honeydew of psyllid colony on *Piliostigma thonningii*', and this suggests that the flies on *Vigna* were probably also attracted by the honeydew, an attraction which has been observed in some other chloropids. K. A. Spencer (in litt.) has also observed that these flies walk unusually rapidly over the leaves.

Collections have been referred to by the name of the city, or the collector (if private collection), as follows:

Brussels: Musée Royal d'Histoire Naturelle
Budapest: Hungarian Natural History Museum
Cardiff: National Museum of Wales, Cardiff, Wales
Lawrence: Snow Collection, Dept. of Entomology, University of Kansas, Lawrence, Kansas
London: British Museum (Nat. Hist.)
Ludwigsburg: Staatliches Museum für Naturkunde, Zweigstelle Ludwigsburg, Federal Republic of Germany
Paris: Museum National d'Histoire Naturelle, Entomologie
Pietermaritzburg: Natal Museum
Pretoria: National Collection of Insects, Pretoria, South Africa
Spencer: K. A. Spencer, Callington, Cornwall, United Kingdom
Tananarive: Institut de Recherche Scientifique de Madagascar.
Tervuren: Musée Royal de l'Afrique Centrale, Tervuren, Belgium
Washington: National Museum of Natural History, Smithsonian Institution, Washington, D.C.

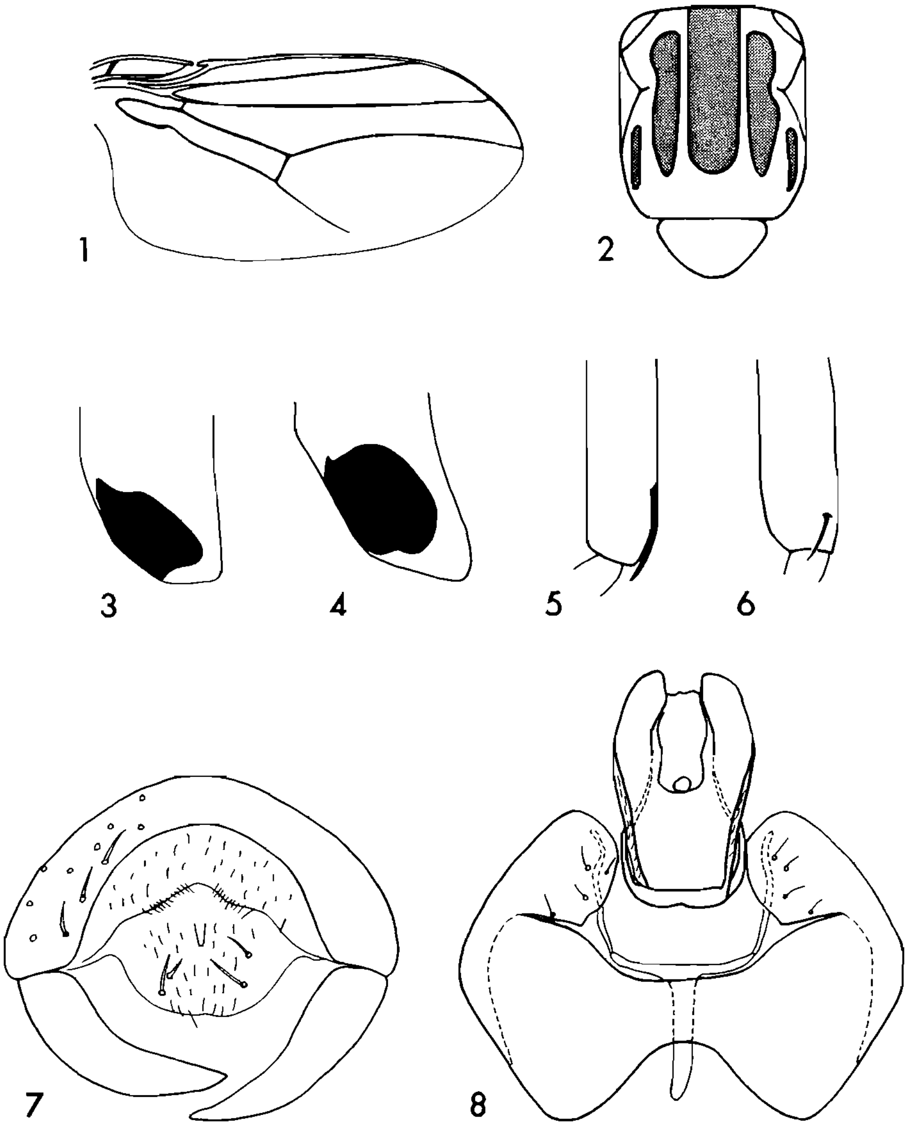
Arcuator gen. n.

Type species, *Hippelates stigmaticus* Lamb, 1912.

Small yellow species, usually with more or less distinct mesocutal stripes that end well before the scutellum.

Head higher than long; eyes sparsely micropubescent; frons in both sexes wider than an eye and nearly half width of head, parallel sided; frontal triangle short, ending about midway on frons, with or without microtomentum, if the latter highly shining but finely wrinkled or grooved; antennae inserted at level opposite middle of eye, 3rd segment broader than long, slightly reniform; arista pubescent, usually micropubescent to short pubescent (but in an Oriental species so densely long pubescent that the arista superficially appears thickened as in *Elachiptera*); face concave, not carinate; subcranial (oral) cavity short, broader than long; proboscis short. Cephalic chaetotaxy: the usual inner and outer vertical bristles and decussate postocellars; ocellars erect, slightly recurved, usually parallel but sometimes convergent; 3 or 4 well-developed and well-spaced fronto-orbital bristles; bristly interfrontal setae well distant from surface of triangle, frontalia otherwise sparsely haired.

Mesoscutum convex; scutellum short, evenly rounded distally, only slightly convex; pleuron often with single large polished black spot, on mesopleuron (Figs 3–4). Thoracic chaetotaxy: 1 weak humeral, 1 + 2 notopleural, 2 postalar, 1



Figs 1–8. *Arcuator* species. 1–2, 5, 7–8. *A. stigmaticus*. 1. Wing. 2. Mesonotum. 5. Apex of hind tibia. 7–8. Posterior and ventral aspects of male genitalia. 3. *A. nigerensis* mesopleuron. 4. *A. munroi* mesopleuron. 6. *A. sextriatus* apex of hind tibia.

posterior dorsocentral, 1 apical and 1 subapical pair of bristles; apical scutellars widely separated.

Fore femur often with conspicuous row of strong bristles posteroventrally; hind tibia with preapical ventral spur that ranges from strong and longer than tibial diameter (which led to the placing of some species in *Hippelates*) to a short spur about half the tibial diameter (Figs 5–6); hind tibia with elongate-oval tibial organ ('sensory area'), ⅓ length of tibia; male without femoral organ on mid femur.

Wing (Fig. 1) with long 2nd costal sector, easily twice the length of 3rd sector; discal cell slender, small crossvein (r–m) basad of middle of discal cell; ultimate section of 4th vein (M) strongly arched, convex anteriorly.

Male genitalia (Figs 7–8): Epandrium of the usual horseshoe shape, with a number of strong erect bristles; surstyli simple and discrete, movable, relatively long, fingerlike, in profile as long or longer than height of epandrium. Cerci fused as a broad mesolobe with numerous setae and a few strong bristles, the ventral margin rounded. Hypandrium broad, incomplete posteriorly, with a short and broad lobe on each side that is folded against the main body of the hypandrium in such a way as to give the appearance of being jointed. Phallus broad, largely membranous or only weakly sclerotised, bordered by what appear to be pre- and postgonites adorned with appressed black setae.

Female terminalia of the usual type for Chloropidae, cerci as simple lappets.

An excellent figure of the whole fly of the type species was published by Bezzi *in* Bezzi & Lamb (1926, Fig. 14), as *Hippelates bipustulatus*, and a photograph of the wing of *stigmaticus* by Lamb (1912, Fig. 20).

The species are so fundamentally similar that the descriptions, except for that of the type species, include only those features in which each species departs significantly from a general description. The flies are small, 1,25–1,5 mm, occasionally slightly larger; chiefly yellow, usually with the aristae, ocellar tubercle, bidentate spot on the occiput, large and polished black spot on the mesopleuron, and all bristles black; mesonotal stripes reddish; mediotergite of postnotum polished and dark reddish black; fore tarsus chiefly infuscated, often paler towards base, the other tarsi with one or two distal tarsomeres infuscated. Mesoscutum with three broad stripes and two supra-alar vittulae (Fig. 2), the stripes ending posteriorly just in advance of the posterior dorsocentral bristles. Male and female terminalia yellow or at most weakly brown except in the type species, in which they are black.

The name of the genus is derived from the Latin *arcuatus*, bow shaped, and written as a noun, *Arcuator*, one who bows or arches. The name is masculine.

Key to Afrotropical and Palaearctic species of *Arcuator*

1 Mesoscutum highly shining, non-microtomentose except for extreme sides and narrow prescutellar area 2
— Mesoscutum subshining, sparsely to heavily microtomentose 6

2 Cheek obviously narrower than breadth of 3rd antennal segment, approximately as 5: 9, and ⅕ or slightly over ⅕ the eye height 3
— Cheek broader, over ⅓ eye height (3rd antennal segment missing) (Ghana) . . . . **Arcuator** sp. n.

3 Male 4
— Female 5

4 Third antennal segment entirely black (Zaïre) .... **dewittei** sp. n. ♂
— Third antennal segment black only on dorsal $\frac{1}{4}$ to $\frac{1}{3}$ (Ghana) .... **aburensis** sp. n. ♂

5 Females of both *dewittei* and *aburensis* have entirely black 3rd antennal segment, but cannot be distinguished, at least for the present. Three isolated females also key here, from South Africa (Natal), Uganda (Ruwenzori Range), and Madagascar, but either or all might represent still undescribed species with similar females.

6 Second antennal segment yellow, 3rd segment black or yellow; tibial organ posterodorsally on hind tibia yellow to reddish yellow 7
— Both 2nd and 3rd antennal segments black; tibial organ on hind tibia large and black, contrasting with chiefly yellow legs; [hind tibial spur short; mesoscutal stripes and 4 pleural spots black] (Kenya, Ethiopia) ...... **melanicus** sp. n. ♀

7 Third antennal segment bicoloured in both sexes, chiefly yellow, black on dorsal $\frac{1}{3}$; [hind tibial spur short; mesoscutal stripes black] (Zaïre) .... **latimaculosus** sp. n. ♂ ♀
— Not so, 3rd antennal segment entirely black or entirely yellow, at most narrowly infuscated on dorsal margin or around base of arista 8

8 Hind tibial spur relatively strong, as long as or longer than greatest diameter of tibia (Fig. 5) 9
— Hind tibial spur obviously shorter than greatest diameter of tibia, usually appearing weak and about half diameter of tibia (Fig. 6) 10

9 Cheek relatively narrow, barely over half width of 3rd antennal segment and $\frac{1}{5}$ eye height; 3rd antennal segment yellow in both sexes; male and female terminalia black or blackish; three broad mesoscutal stripes ending posteriorly just anterior to posterior dorsocentral bristles (widespread Afrotropical) ..... **stigmaticus** (Lamb) ♂ ♀
— Cheek obviously wider, about equal to breadth of 3rd antennal segment and $\frac{1}{3}$ eye height; 3rd antennal segment black in both sexes; male and female terminalia yellow; lateral mesoscutal stripes distinctly longer than median stripe and reaching to or over sides of scutellum (Ethiopia, Rodriguez, ?Gambia, ?Natal, ?Mozambique) .... **opacus** (Becker) ♂ ♀

10 Palaearctic species; 3rd antennal segment black in female, chiefly yellow in male; cheek broad, equal to breadth of 3rd antennal segment and over $\frac{2}{5}$ eye height (Hungary) .... **sexstriatus** (Becker) ♂ ♀
— Afrotropical species; 3rd antennal segment not so, same in both sexes, black or chiefly yellow; [cheek broad or narrow] 11

11 Third antennal segment yellow or chiefly so in both sexes 12
— Third antennal segment black or (rarely) almost entirely so 13

12 Mesopleural black spot relatively large and broad, strongly convex dorsally, approximately $\frac{2}{3}$ as broad as long (Fig. 4); typically 3 pairs of strong black fronto-orbital bristles .... **munroi** sp. n. ♂ ♀

— Mesopleural black spot relatively narrow, only slightly convex dorsally and approximately half as broad as long (Fig. 3); typically 4 pairs of slender fronto-orbital bristles (West Africa) .... **nigerensis** sp. n. ♂ ♀

13 Cheek moderately narrow, $\frac{1}{4}$–$\frac{1}{5}$ eye height and obviously narrower than breadth of 3rd antennal segment 14

— Cheek broad, $\frac{1}{3}$–$\frac{2}{5}$ eye height and equal to or wider than breadth of 3rd antennal segment (South Africa, Namibia) .... **Arcuator** spp. n.

14 Pleuron with one black spot, a large shining spot on mesopleuron (Figs 3–4); legs yellow (Central Africa) .... **lindneri** sp. n. ♂ ♀

— Pleuron with 4 blackish spots; all femora weakly brown on middle third (Namibia, Nigeria) .... **deemingi** sp. n. ♂ ♀

Arcuator sp. n.

One ♂, 'Gold Coast' [= Ghana]: Aburi, 1912–13 (W. H. Patterson) [London] is left undescribed because this unique specimen is damaged, lacking antennae and four legs. The cheek is broader than in any of the other species with polished mesoscutum, and by this the species should be recognisable in both sexes. The hind tibial spur is strong, slightly longer than the diameter of the tibia.

Arcuator dewittei sp. n.

Mesoscutum polished, and 3rd antennal segment black in both sexes.

Male and female. Colour, stripes, and size as in general description; 3rd antennal segment entirely black in both sexes. Frontal triangle polished, non-microtomentose; 3 pairs of well-developed fronto-orbital bristles; cheek relatively narrow, as in *aburensis*. Mesoscutum highly shining, polished, except narrowly on extreme sides and posteriorly. Fore femur with one or two strong black bristles outstanding in the posteroventral row; hind tibial spur moderately strong, subequal to greatest diameter of tibia.

Holotype ♂ and allotype, Zaïre (as 'Congo belge'): Kivu, Rutshuru, 1285 m, July 6, 1935 (G. F. de Witte, no. 1615). Paratypes (Zaïre, all but last one collected G. F. de Witte): 58 ♂ 31 ♀, same locality as holotype, various dates 1934–35; 3 ♂ 3 ♀, Albert National Park: N'Zulu (Lac Kivu), 1 500 m, Feb. 6–7, 1934; 2 ♂ 4 ♀, Albert National Park: Rwindi, Nov. 20–24, 1934; 1 ♂, Albert National Park: Kanyabayongo (Kabasha), 1 760 m, Dec. 6, 1934; 1 ♀, Albert National Park: Ishango, Dec. 11, 1935 (Mission H. Damas). Type and most paratypes in the Musée Royal de l'Afrique Centrale, Tervuren, Belgium, paratypes in Washington.

This species is one of the few with a polished mesoscutum. It is distinct from *A. aburensis*, at least in the male, but I have been unable to distinguish females of the two species.

The species is dedicated to the able and energetic collector, G. F. de Witte.

Arcuator aburensis sp. n.

Mesoscutum polished, and 3rd antennal segment partly yellow in male, all black in female.

Male. Colour, stripes, and size as in general description; 3rd antennal segment chiefly yellow, black dorsally up to $\frac{1}{3}$ of segment. Frontal triangle polished, non-microtomentose; 3 pairs of well-developed fronto-orbital bristles; cheek relatively narrow, its height less than half breadth of 3rd antennal segment and $\frac{1}{6}$ eye height. Mesoscutum highly shining, polished, except narrowly on extreme sides and posteriorly. Fore femur with only one strong and outstanding black bristle in the posteroventral row; hind tibial spur moderately strong, approximately equal to greatest diameter of tibia.

Female. As described for ♂, but 3rd antennal segment entirely black.

Holotype ♂, allotype, and 7 paratypes (2 ♂ 5 ♀), 'Gold Coast' [= Ghana], Aburi, 1912–13 (W. H. Patterson) [London; paratypes in Washington]. Two other females, same data, are headless and not included in the type series.

The striking difference in the colour of the 3rd antennal segment in males and females distinguishes this species from *A. dewittei*, the other named species with polished mesoscutum.

One male, Makoa, Tanzania, Feb. 22–23, 1952, received from E. Lindner [Ludwigsburg], may be *aburensis*, but the 3rd antennal segment is more extensively infuscated. This plus its considerable geographical separation lead me to suspect that it might represent a distinct species, but I prefer to await adequate material of both sexes of the Tanzania form. This specimen was recorded by Sabrosky (1954) as '*Hippelates* n. sp. near *stigmaticus* Beck.' (error for Lamb).

The specific name is an adjective formed from the name of the type locality.

Arcuator sp. or spp. ♀♀

(near *dewittei* and *aburensis*)

Three females that cannot be distinguished in this sex from each other and from *dewittei* and *aburensis* must be left unplaced: Natal: Umhlanga Bush near Durban, Feb. 1963 (B. & P. Stuckenberg) [Pietermaritzburg]; Uganda: Ruwenzori Range, Namwamba Valley, 10 100 ft., Dec. 1934–Jan. 1935 (T. H. E. Jackson) [London]; Madagascar: Nord-Ouest, Nosy Mitsio, Jan. 13–14, 1960 (R. Paulian) [Tananarive]. The Uganda specimen was recorded by me in 1951 in the fascicle on Chloropidae of the Ruwenzori Expedition, as 'Species near *Hippelates stigmatica* Lamb'.

Arcuator melanicus sp. n.

Mesoscutal stripes, 4 pleural spots, both 2nd and 3rd antennal segments, and frontal triangle in part black.

Female. More black areas than in the general description, including mesoscutal stripes and supra-alar vittulae, polished spots on meso-, ptero-, sterno-, and hypopleuron, 2nd and 3rd antennal segments, and frontal triangle in large part; hind tibial organ ('sensory area' of authors) black, conspicuous on the yellow legs. Frontal triangle polished; 3 pairs of slender fronto-orbital bristles; cheek moderately broad, about equal to breadth of 3rd antennal segment and $\frac{2}{5}$ eye height. Mesoscutum distinctly microtomentose on the background of black stripes.

Fore femur with only slender yellow bristles in the posteroventral row; hind tibial spur stout but short, half the greatest diameter of tibia.

Holotype ♀, Kenya: Sigona, Muhia Farm, Apr. 13, 1983 (K. A. Spencer) [Spencer]. Paratypes: 1 ♀, same data as holotype [Spencer]; 2 ♀, Central Ethiopia: Managascha, 3 000 m, May 18, 1914 (O. Kovács) [London].

Although males are not available, the striking colour characteristics that distinguish this species should be the same in males as in females. There should not be any confusion between *melanicus* and *latimaculosus* because of the microtomentose frontal triangle and chiefly yellow antennae of the latter.

The specific name is an adjective derived and latinised from the Greek *melas*, *melanos*, meaning black.

Two females, Ruanda: Kayove and Volc. Muhavura [Tervuren], the former published as a male of *Hippelates* sp. near *stigmaticus* by Sabrosky (1955), are close to *melanicus* and may be the same species. They agree with *melanicus* in the short hind tibial spur, strikingly black tibial organ on the hind tibia, and black antennal segments. The pleural spots are fewer in number, possibly merely undeveloped.

Arcuator latimaculosus sp. n.

Mesoscutum and frontal triangle microtomentose; 3rd antennal segment chiefly yellow in both sexes, black on dorsal third; hind tibial spur very short.

Male, female. Colour as in general description, except mesoscutal stripes black and pleuron with long and narrow polished pitch-black spot on mesopleuron and probably typically with spots on pro-, ptero-, sterno-, and hypopleuron; 3rd antennal segment chiefly yellow, black on dorsal third; ♂ and ♀ terminalia blackish. Frontal triangle slightly shining, thinly microtomentose; 4 pairs of well-developed fronto-orbital bristles; cheek narrow, only $\frac{1}{3}$ breadth of 3rd antennal segment and $\frac{1}{6}$–$\frac{1}{8}$ eye height. Mesoscutum bright gray microtomentose, especially distinct on background of black stripes. Fore femur with only weak yellow bristles in posteroventral row; hind tibial spur exceptionally short and weak, only $\frac{2}{5}$ greatest diameter of tibia.

Holotype ♂, Zaïre: Eala, Nov. 1934 (J. Ghesquière) [Brussels]. Allotype, Zaïre: Uelé, Buta, Apr. 11, 1935 (G. F. de Witte) [Tervuren]. Paratypes [Tervuren]: Zaïre: 1 ♂ 1 ♀, Kivu: Rutshuru, 1 285 m, June 6 and July 12 (♂), 1935 (G. F. de Witte); 1 ♀, Kivu: Nyongera (près Rutshuru), 1 218 m, July 17, 1935 (G. F. de Witte). The female paratypes are not in good condition but I have included them in the type series because they have contributed to evaluation of the characteristics of the species, in view of the small number of specimens.

The holotype, which is the best specimen, shows definitely black mesoscutal stripes and five dark reddish black spots on the pleuron. Somewhat teneral specimens show dark reddish spots on meso- and pteropleuron but only suggestions of spots on the other areas.

The combinations of features used in the diagnosis will distinguish *latimaculosus* at once from other known species in the genus.

The specific name is an adjective compounded from the Latin *latus*, side, and *macula*, spot.

Arcuator stigmaticus (Lamb), **comb. n.**

Oscinella pectoralis Becker; Becker, 1910*b*, *Annls. hist.-nat. Mus. natn. hung.* **8**: 435 (Tanzania: Moschi and Mto-ju-kifaru). Misident.

Hippelates stigmatica Lamb, 1912, *Trans. Linn. Soc. London, ser. 2, Zool.*, **15**: 334, Fig. 20 (Seychelles).

Oscinella sexstriata Becker; Becker, 1916, *Annls. hist.-nat. Mus. natn. hung.* **14**: 436 (Uganda: Mujenje series only). Misident. [Of the two Pretoria specimens, one is probably a new species of *Arcuator* and the other is a completely different genus, probably new].

Hippelates jacobsi Tonnoir, 1921, *Bull. Soc. ent. Belg.* **3**: 134 (Luxemburg). **Syn. n., comb. n.**

Hippelates planiscutellatus Becker; Séguy, 1938, *Mission scient. Omo, IV (Zool.)* (fasc. 39): 361 (Kenya: Mt. Elgon). Misident.

Hippelates stigmaticus; Sabrosky, 1954, *Bull. Brooklyn ent. Soc.* **15**: 39 (Tanzania); Sabrosky, 1965, *Stuttg. Beitr. Naturk.*, no. **138**: 6 (Tanzania: Makoa, 'b.[ei] Kaffeeschildläusen,' and Marangu) [Notes on characters].

Chiefly yellow, with reddish and thinly microtomentose mesoscutal stripes, polished frontal triangle, antennae yellow in both sexes, moderately strong hind tibial spur, and blackish male and female terminalia.

Male. Chiefly yellow, only the aristae, ocellar tubercle, bidentate spot on occiput, large and polished spot on mesopleuron, and all bristles and most hairs black; mesoscutal stripes reddish; mediotergite of postnotum polished and dark reddish-black; terminalia black or blackish; typically fore tarsus entirely and distal two tarsomeres of mid and hind tarsi black, the fore tarsus often paler proximally in many specimens, which may be somewhat teneral.

Frontal triangle polished, non-microtomentose; 4 pairs of well-spaced fronto-orbital bristles, foremost pair weaker than the others; height of cheek $\frac{1}{5}$ eye height and slightly over $\frac{1}{2}$ breadth of 3rd antennal segment; antenna entirely yellowish.

Mesoscutum and scutellum subshining, thinly but distinctly microtomentose, former with 3 broad stripes and 2 supra-alar vittulae, the stripes ending posteriorly just in advance of the posterior dorsocentral bristles (Fig. 2); polished black spot on mesopleuron especially large, convex dorsally.

Fore femur with even posteroventral row of strong bristles; hind tibial spur strong, preapical $\frac{2}{3}$ of its length, its length 1,3 times greatest diameter of tibia (Fig. 5).

Male genitalia as figured (Figs 7–8) and as described for the genus.

Length, 1,25–1,5 mm.

Female. Similar to ♂, notably with antennae entirely yellow. Cerci and preceding tergite black.

A long series of 50 specimens from the Seychelles, including a male and two females from the original type series, gave opportunity for evaluating the characters used here in the key. The strong hind tibial spur, large oval black spot on the mesopleuron, and black or blackish terminalia in both sexes were consistent. The four pairs of fronto-orbital bristles were consistent except in two specimens, one male and one female, which had 3 bristles on one side and 4 on the other, an aberrant condition that is no surprise in chaetotactic characters. The fore tarsi were always completely and definitely black in the females; in the males they were infuscated on two or three distal tarsomeres but paler towards the base. Even so, they were definitely not yellow, but were brownish-yellow on the proximal tarsomeres, becoming darker distally. The strong bristles in a posteroventral row on the fore femur varied in number, but there were always some strong, straight, usually brown to blackish bristles in the row, from 2 to 7 or 8, which causes one to be cautious in other species about apparently consistent numbers when only a few specimens are available.

This is the most common and widely distributed species of the genus, at least in the Afrotropical Region. Specimens have been seen from the following countries: Cameroon, Ethiopia, Gambia, Ghana, Kenya, Liberia, Malagasy Republic (Madagascar), Mozambique, Nigeria, Rodriguez, Seychelles, South Africa (Natal, Transvaal), Tanzania, Uganda, Zaïre, Zambia, Zimbabwe.

I saw the female holotype of *Hippelates jacobsi* in Brussels many years ago, and my notes clearly place it in *Arcuator*. The combination of the original description and my notes enable me to say that it comes out at *stigmaticus* in my key. The mesonotum is microtomentose ('d'une fine pruinosité dorée'), the hind tibial spur relatively strong, the cheek narrow, the fore tarsus black, and the 3rd antennal segment yellow. It cannot be the other Palaearctic species, *A. sexstriatus*, of which the female has a black 3rd antennal segment. Tonnoir also noted that the genitalia were black, which would fit *stigmaticus* perfectly. I place it, tentatively, as a synonym of *stigmaticus*. As far as I am aware, it has not been collected again in Europe.

Arcuator opacus (Becker), **comb. n.**

Hippelates opacus Becker, 1912, *Annls. hist.-nat. Mus. natn. hung.* **10**: 249 (Ethiopia).
H. bipustulatus Bezzi *in* Bezzi & Lamb 1926, *Trans. ent. Soc. London* **1925**: 557 (Rodriguez). **Syn. n., comb. n.**

Mesoscutum subshining, thinly microtomentose; cheek broad; 3rd antennal segment black in both sexes.

Male, female. Colour, stripes and size as in general description, except for longer lateral stripes on mesoscutum; 3rd antennal segment entirely black in both sexes. Frontal triangle polished, non-microtomentose; 4 pairs of fronto-orbital bristles, obviously more slender than verticals and postocellars; cheek relatively broad, fully as wide as 3rd antennal segment and $\frac{1}{3}$ eye height. Mesoscutum subshining, thinly microtomentose, lateral stripes distinctly longer than median stripe, reaching to or over sides of scutellum. Fore femur typically with strong black bristles outstanding in posteroventral row, varying in number from 3 to 7 in the few available specimens; hind tibial spur strong, equal in length to greatest diameter of tibia.

Besides the two male syntypes [Budapest] and the holotype of *bipustulatus* [London], I have seen only a male and two females, Alemaya, Harrar, Ethiopia, April 16, 1960 (W. C. Kurtz) [Washington]. A male from Mozambique, Lourenço Marques, Nov. 1957 (N. L. H. Krauss) [Washington]; and females from South Africa, Natal, Mtubatuba, Mar. 24–25, 1968 (P. J. Spangler) [Washington], Zaïre, Stanleyville, Nov. 1956 (N. L. Krauss) [London], and Gambia, July–Sept. 1927, ex groundnut plots [London]. A male from Nigeria, Aug. 16, 1969 (J. T. Medler) [Washington] might represent a different species; it is close to *opacus*, but has a slightly narrower cheek. The records suggest as wide a distribution as that of *stigmaticus*, but the species is much less common in collections.

The species differs from all others treated in this paper in having the lateral stripes of the mesoscutum distinctly longer than the median stripe. In the darkest individual each lateral stripe appears to merge with the supra-alar vittula and to extend onto the side of the scutellum. In *stigmaticus* and other species, the median and lateral stripes are approximately the same length, the laterals ending well in advance of the dorsocentral bristles.

The synonym *bipustulatus* is an interesting example of confusion. Bezzi described it from the one male sent to him as having antennae black (actually only the 3rd segment), but the other specimens noted in Lamb's introductory statement to the species have yellow antennae, at least three I have seen, and they are *stigmaticus*. Figure 14 of '*bipustulatus*' is actually *stigmaticus*, with yellow antennae, obviously drawn from one of the '6 other examples' cited by Lamb.

Arcuator sexstriatus (Becker), **comb. n.**

Oscinella pectoralis Becker, 1910, *Archvm. Zool.* (Bpest) **1**: 160 [Hungary, inferred].
O. pectoralis; Becker, 1910, *Annls. hist.-nat. Mus. natn. hung.* **8**: 435 (Hungary, stated) [East African records are actually *A. stigmaticus*].
O. sexstriata Becker, 1912, *Annls hist.-nat. Mus. natn. hung.* **10**: 645 [New name for *pectoralis* Becker, preocc. in *Oscinella* by *Oscinis pectoralis* Coquillett 1898].
O. pectoralis; Duda, 1933, Chloropidae, [Fam.] **61**: 85, 94, *in* Lindner (ed.), *Flieg. palaearkt. Reg.*

The species was described from two specimens, one in the Zoologisches Museum in Berlin and the other in Thalhammer's collection. In 1937 I studied the syntype female in Berlin. Recently I saw six specimens (2 ♂ 4 ♀), from Vaskút, Hungary, from the Thalhammer collection in Budapest, loaned by courtesy of A. Dely-Draskovits, which are topotypic. One may be the second syntype, although none has Becker's characteristic label. Duda, who mentioned these specimens in his monograph of the Palaearctic Chloropidae, labeled them *Oscinella pectoralis*, having overlooked Becker's renaming of the species because of secondary homonymy.

The short and weak hind tibial spur (Fig. 6) was either overlooked or disregarded in describing the species in *Oscinella*. Afrotropical species were recorded several times as *pectoralis* or the replacement name *sexstriata*, but these have proved to be misidentifications, although understandable because of the close similarity of many of the species and the lack at that time of good series for study. Duda obviously erred in keying and describing *sexstriatus* (as *pectoralis*) as having the 3rd antennal segment entirely black, when this is true only for females. Also, Duda incorrectly stated in his key (1933: 85) 'r_5 und m vorn konkav', although in his description (1933: 94) he correctly stated 'in hinten konkav gekrümmt'.

Arcuator munroi sp. n.

Oscinella pectoralis Becker; Becker 1916, *Annls hist.-nat. Mus. natn. hung.* **14**: 436 (Pretoria, Transvaal).

Mesoscutum microtomentose, pleuron with single black spot, hind tibial spur short, 3 pairs of well-developed fronto-orbital bristles, and 3rd antennal segment yellow in both sexes.

Male, female. Colour, stripes, and size as in general description; 3rd antennal segment yellow in both sexes. Frontal triangle shining, but apparently more or less microtomentose, finely; 3 pairs of moderately strong, well-developed fronto-orbital bristles, blackish and distinct; cheek moderately broad, $\frac{3}{4}$ breadth antennal segment and $\frac{3}{10}$ eye height. Mesonotum subshining, thinly microtomentose; mesopleural black spot very convex dorsally (Fig. 3), approximately $\frac{2}{3}$ as broad as long, thus appearing larger and more convex than the spot in *nigerensis*. Fore femur and hind tibial spur about as described for *nigerensis*, the spur a trifle longer in comparison to the greatest diameter of tibia, but still obviously shorter than the diameter.

Holotype ♂, allotype, 4 paratypes (1 ♂ 3 ♀), South Africa: Pretoria, Parasite Laboratory, Feb. 1957, suction trap (H. K. Munro) [Pretoria, paratypes in Washington]. Other paratypes: 1 ♂, South Africa: Pretoria (det. Becker as *sexstriata*) [Budapest]; 6 ♂ 1 ♀, South Africa: Natal, New Hanover, Aug. 1914 (H. K. Munro) [Pretoria]; 2 ♂ 7 ♀, Zimbabwe; Salisbury, 5 500 ft., Nov. & Dec. 1900 (F. L. Snow) [Lawrence]; 1 ♀, Namibia: Okahandja, Feb. 3–9, 1928 (R. E. Turner) [London].

A. munroi, one of the species with short hind tibial spur, has a large and convex black mesopleural spot and 3rd antennal segment yellow in both sexes. It is understandable that Becker identified a single male from Pretoria as *sexstriata* (published as *pectoralis*, the replacement name), because males of the two are indistinguishable in external appearance.

I am pleased to dedicate this species to Dr H. K. Munro, who submitted part of the type series to me many years ago.

Arcuator sp. near *munroi*

A single female, Ethiopia: Marako, Mar. 1912 (Kovács) [Budapest], identified by Becker as *Oscinella pectoralis*, will key directly to *A. munroi*, but the 3rd antennal segment is infuscated along the dorsal margin, suggesting that another species may be present.

Arcuator nigerensis sp. n.

Mesoscutum microtomentose, pleuron with single relatively narrow black spot, hind tibial spur short, 4 pairs of slender fronto-orbital bristles, and 3rd antennal segment yellow in both sexes.

Male, female. Colour, stripes, and size as in general description; 3rd antennal segment yellow in both sexes. Frontal triangle shining, non-microtomentose; typically 4 pairs of slender fronto-orbital bristles, foremost pair weaker than others; cheek moderately broad, nearly $\frac{3}{4}$ breadth of 3rd antennal segment and $\frac{3}{10}$ eye height. Mesoscutum subshining, thinly microtomentose; mesopleural black spot only slightly convex dorsally, relatively narrow, approximately half as broad as long (Fig. 4). Fore femur posteroventrally with row of yellowish bristles, not very conspicuous, no strong and outstanding black bristles; hind tibial spur very short, no more than half greatest diameter of tibia.

Holotype ♂, allotype, 52 paratypes (20 ♂ 32 ♀), Niger: Tarna, on *Vigna*, May 10 & Oct. 10, 1967 (Brenière) [Paris, some paratypes in Washington]. Other paratypes: 2 ♂ 1 ♀, Senegal: 15 km S of Guiguol, Oct. 6, 1978 (G. Hevel & J. Fortin) [Washington]; 2 ♂ 1 ♀, N. Nigeria: Zaria, Samaru, May 1979, 'feeding on honeydew of psyllid colony on *Piliostigma thonningii*' (J. C. Deeming) [Cardiff]; 1 ♂, N. Nigeria: Sokoto, Argungu, Aug. 25, 1972 (J. C. Deeming) [Cardiff].

Like *A. munroi*, this species has the 3rd antennal segment yellow in both sexes and it is thus distinct on the one hand from *lindneri*, with 3rd antennal segment black in both sexes, and on the other hand from the European *sexstriatus*, with 3rd antennal segment chiefly yellow in the male and chiefly black in the female. The mesopleural spot is relatively small and narrow, but this character can confuse one if drying has buckled the mesopleuron so that the dorsal margin appears convex.

The specific name is an adjective based on the name of the country Niger.

Arcuator spp. n.

A female from South Africa: Cape Province, Huguenot, Feb. 1932 (J. Ogilvie) [London] and a male (?), Namibia: Goanikontes, 21 mi SE. Swakopmund, Jan. 30, 1972 (Brian Cogan, Southern African Expedition) [London] cannot be associated with any of the other species and appear to represent two undescribed species. The broad cheek is distinctive among the species with microtomentose frontal triangle.

Arcuator lindneri sp. n.

Hippelates sp. near *opacus* Becker; Sabrosky 1965, *Stuttg. Beitr. Naturk.* **138**: 6 (Marangu, Tanzania).

Mesoscutum microtomentose, pleuron with a single black spot, hind tibial spur short, 3rd antennal segment black in both sexes.

Male, female. Colour, stripes, and size as in general description; 3rd antennal segment black in both sexes. Frontal triangle polished, non-microtomentose; 3 pairs of well-developed fronto-orbital bristles; cheek moderately narrow, obviously narrower than breadth of 3rd antennal segment and about $\frac{1}{5}$ eye height. Mesoscutum subshining, thinly microtomentose. Fore femur with posteroventral row of strong yellow bristles; hind tibial spur short, obviously less than (about $\frac{2}{3}$) greatest diameter of tibia.

Holotype ♂, N. Nigeria: Zaria, Samaru, Sept. 1979 (J. C. Deeming) [Cardiff]. Allotype, same data except Nov. 1979 [Cardiff]. Paratypes: Nigeria: 1 ♂ 2 ♀, same data as holotype except July 15, 1968 (♂), and Sept. and Oct. 1979 (2 ♀); 1 ♂, Mambilla Plateau, Ngel Nyaki, montane forest, *c.* 5 500 ft., Nov. 28–Dec. 3, 1968 (Deeming) [Cardiff, Washington]; 1 ♀, Ogoja Co., Aug. 2, 1961 (R. W. Meyer) [Washington]; 1 ♀, Ogoja, SE State, Mar. 17, 1971 (J. T. Medler) [Washington]; 2 ♂, Onya, SE State, Mar. 17 and 18, 1971 (Medler); 2 ♀, Ile Ife, June 15 and July 15, 1969 (Medler) [Washington]. Zaïre: 1 ♂, Gangala Na Bodio, Elephant Farm (Mangara to Farajde), Apr. 29, 1955 (Baker and Schmitt) [Washington]; 1 ♂ 1 ♀, Ganajika (Lomami), Nov. 3, 1934 (D. Soyer) [Tervuren]; 1 ♂, Kivu, Rutshuru (riv. Musugereza), 1 100 m, July 9, 1935 (G. F. de Witte) [Tervuren]. Zimbabwe: 2 ♀, Salisbury, Dec. 1899, 5 050 ft. (F. L. Snow) [Lawrence]. Ghana: 1 ♀, Legon, Feb. 26, 1969 (O. W. Richards) [London]. Ivory Coast: 1 ♂, 'Lamto' [laboratories n. of Tombo and e. of Bouaflé], Feb. 7, 1971 (D. Lachaise) [Paris]. Kenya: 1 ♀, Nairobi, Dec. 8, 1971, 'herbage bordering stream' (J. C. Deeming) [Cardiff]; 1 ♀, Embu, Hotel Izaak Walton, Apr. 16, 1983 (K. A. Spencer) [Cardiff]; 1 ♂, Embu, Dec. 9, 1983 (K. A. Spencer) [Cardiff]. Tanzania: 2 ♀, Marangu, Mar. 1–20, 1959 (E. Lindner) [Ludwigsburg].

This species is one of a group of five species with single black pleural spot that have the hind tibial spur short and relatively weak and inconspicuous, hence usually called *Oscinella* in Becker's time, whereas *stigmaticus* and *opacus*, with stronger and longer spur, were placed in *Hippelates* (cf. Figs 5–6). *A. lindneri* is the only one of the five with the 3rd antennal segment black in both sexes, which originally led me to place it as a species 'near *opacus*'. In 1965 I distinguished the two females from *stigmaticus*, but at the time the limited amount of material available did not permit a resolution of the species problem.

I am pleased to dedicate this species to my respected friend, Prof. Dr E. Lindner, distinguished dipterist, who kindly made available to me many interesting specimens from his collecting in Africa.

Arcuator deemingi sp. n.

Mesoscutum microtomentose over reddish stripes; pleuron with 4 blackish spots; 3rd antennal segment black, 2nd yellow; cheek relatively narrow.

Male. Chiefly yellow, only the 3rd antennal segment and arista, ocellar tubercle, ventral half of occiput (spot weakly bidentate dorsally), 4 pleural spots, mediotergite of postnotum, fore tarsus, and all bristles and hairs black; mesoscutal stripes reddish; abdomen more or less infuscated; all femora weakly brown on middle ⅓, at least in part; terminalia blackish.

Frontal triangle shining but minutely shagreened; 3 or 4 pairs of well-spaced fronto-orbital bristles, the foremost pair weakest; cheek moderately narrow, ¼ eye height and ⅗ breadth of 3rd antennal segment. Mesoscutum and scutellum subshining, thinly but distinctly microtomentose, former with 3 broad reddish stripes and 2 supra-alar vittulae (cf. Fig. 2). Fore femur posteroventrally without strong bristles; hind tibial spur short and weak, ½ greatest diameter of tibia.

Holotype ♂, allotype, 3 paratypes (1 ♂ 2 ♀), Namibia: Nr. Onseepkans, Orange R. banks, Jan. 8–10, 1972 (Brian Cogan, Southern African Expedition) [London]; 1 ♂ paratype, N. Nigeria: Zaria, Samaru, Aug. 24, 1979 (J. C. Deeming), 'ex flowering ornamental *Piliostigma*'. [Cardiff].

This species resembles *latimaculosus* and *melanicus* in having more pleural spots than in more characteristic species of the genus, but it is unlike either with its combination of black 3rd antennal segment and yellow 2nd segment, and in having reddish mesonotal stripes.

I take pleasure in naming this species for J. C. Deeming who has contributed so much to knowledge of the Diptera of Nigeria and of the family Chloropidae.

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